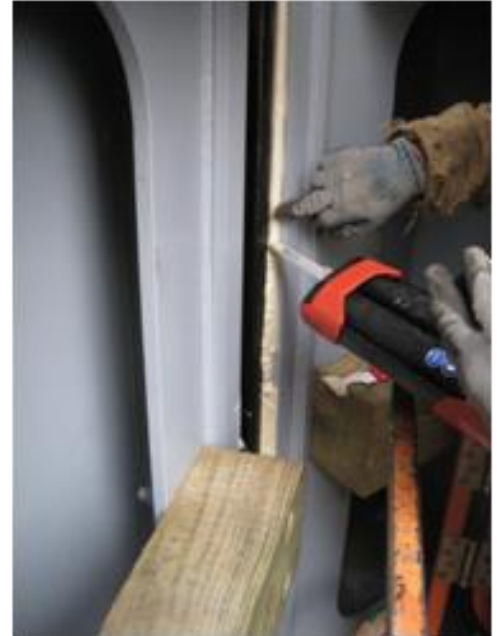




# Sealing Techniques for Miter and Quoin Block Backing Materials

## Problem

The epoxy backing materials have viscosities that allow them to be poured behind quoin and miter blocks in sections. The gaps are sealed with body filler materials (e.g. Bondo) to contain the epoxy backing material until it is cured. Often, the surface preparation on the quoin block and channel is not ideal for proper adhesion of the currently used sealants. The sealing materials can fail as the pressure head of the epoxy material increases while being poured, causing the epoxy material to leak out. When this happens, the quoin or miter block may have to be removed, cleaned up, and reset, causing significant delay. The backing materials are poured in sections requiring time between fills to allow the epoxy to cure, which increases the overall repair time. This increases overall labor costs and keeps the navigational structure out of operation for longer periods of time.



## Approach

A laboratory mock-up simulating quoin and miter blocks has been constructed in a controlled environment. This mock-up allows control of variables related to surface preparation, gap size, and head pressure. Different sealing materials are being studied to determine their performance. The idea is to seal the quoin block mock-up consistent with current field practice, fill the gap with a suitable liquid, and then incrementally pressurize the system until the sealing material fails. The type and number of failure/leaks and the maximum pressures are recorded, as well as observations related to the use of the material. Adhesion tests will be conducted between the sealing materials and steel substrates for comparison against the mock-up results. The adhesion tests will be conducted at room temperature and at varying temperatures to investigate the sealant suitability in varying environmental conditions.

## Products

Recommendations will be made for improved sealing techniques and materials selection of sealing materials for different temperatures and environmental conditions. Engineering Technical Notes and Technical Reports will be produced and the information will be provided in technical presentations to engineering audiences such as the annual Lock Maintenance Workshop. A standard protocol for long term testing of filler materials' compressive strength, water absorption, elastic modulus, shrinkage/expansion, and aging affects. An update of UFGS 35 20 16.33, "Miter Gates," to include guidance for selection of quoin block filler material.

## Benefits

The main benefit of this work is to reduce the overall installation time and delays related to backer sealing material failures. Better sealing techniques will prevent blowouts and leaks that can result long delays. Materials that perform at higher head pressures will allow the backing materials to be poured in higher sections reducing application time, labor costs, and allow the navigation lock to return to full operation in a shorter time frame.

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